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Canada. Railways, Canals and
Telegraph Lines, Standing Cttee on, 1952

HOUSE OF COMMONS

Sixth Session—Twenty-first Parliament
1952

Government
Publication

STANDING COMMITTEE

ON

RAILWAYS, CANALS AND TELEGRAPH LINES

Chairman: H. B. McCULLOCH, ESQ.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 3

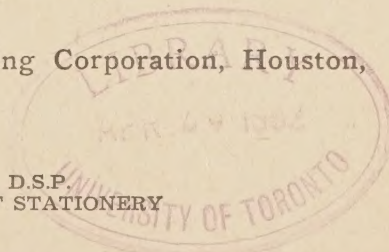
Bill No. 62 (Letter O of the Senate)
An Act to Incorporate Boundary Pipeline Corporation

TUESDAY, APRIL 22, 1952

WITNESS:

Mr. Robert R. Herring of The Fish Engineering Corporation, Houston,
Texas.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1952



ORDER OF REFERENCE

WEDNESDAY, April 9, 1952.

Ordered,—That the said Committee be granted leave to sit while the House is sitting.

Attest.

LEON J. RAYMOND,
Clerk of the House.

REPORT TO THE HOUSE

TUESDAY, April 8, 1952.

The Standing Committee on Railways, Canals and Telegraph Lines begs leave to present the following as its

SECOND REPORT

Your Committee recommends that it be granted leave to sit while the House is sitting.

All of which is respectfully submitted.

H. B. McCULLOCH,
Chairman.

CORRIGENDA

Evidence, Friday, April 4, 1952:

page 13, lines 39 to 41:

The industrial portion of that, the industrial sales would be 16 million per day, and the balance would be between 85 million operating load and the 50 million a day—

should read

The industrial portion of that, the industrial sales would be 16 million per day, and the balance would *be the difference* between 85 percent operating load and the 50 million a day—

page 14, lines 35, 36:

That 6 cents represents 100 to 150 million of the 20 year period which the consumers must try to bear.

should read

That 6 cents represents 100 to 150 million *dollars during* the 20 year period, which the consumers must try to bear.

MINUTES OF PROCEEDINGS

TUESDAY, April 22, 1952.

The Standing Committee on Railways, Canals and Telegraph Lines met at 11 o'clock a.m., the Chairman, Mr. H. B. McCulloch, presiding.

Members present: Messrs. Bonnier, Cannon, Carroll, Cavers, Gourd (*Chapleau*), Green, Healy, Herridge, Hodgson, Lafontaine, Macdonald (*Edmonton East*), MacNaught, McCulloch, McGregor, McIvor, Murphy, Mutch, Nickle, Noseworthy, Richard (*St. Maurice-Lafleche*), Stuart (*Charlotte*), Whitman.

In attendance: Mr. Duncan K. MacTavish, Q.C., Parliamentary Agent; Mr. Robert Herring, representing the Fish Engineering Corporation, Houston, Texas.


Consideration of Bill No. 62 (Letter O of the Senate), "An Act to incorporate Boundary Pipeline Corporation", was resumed.

Mr. Herring was recalled and questioned.

Mr. Herring tabled "Consumer Load Survey for Proposed Transmission Facilities from Medicine Hat to Winnipeg", which is printed as *Appendix A* to this day's Minutes of Proceedings and Evidence.

At 12.17 o'clock p.m. the Committee adjourned to the call of the Chair.

A. L. BURGESS,
Clerk of the Committee.



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EVIDENCE

APRIL 22, 1952.

11:00 a.m.

The CHAIRMAN: Order, gentlemen, I think we have a quorum now.

The first item will be, shall the preamble carry?

Mr. GREEN: We have not completed with Mr. Herring yet, have we?

The CHAIRMAN: No, that is why I asked if the preamble would carry.

Robert R. Herring, of the Fish Engineering Corporation, Houston, Texas, called:

The CHAIRMAN: Are there any questions that you would like to ask Mr. Herring?

Mr. NICKLE: To open proceedings at this time I would like to have Mr. Herring give us in his own words a presentation of a case showing the economics of a pipe line from Medicine Hat to Winnipeg based upon this brief statement already received in printed form, then I should like to proceed with questioning Mr. Herring further after having heard his statement.

The WITNESS: First, Mr. Chairman, I would like to pass out to the committee some detailed facts and figures from our consumer load survey and economic analysis for the construction of the proposed transmission facilities from Medicine Hat to Winnipeg. May I pass out this statement, Mr. Chairman?

The CHAIRMAN: Yes.

The WITNESS: Mr. Chairman, in answer to that question may I say that it is based on an 85 per cent operating load factor on this pipe line. I would like to review the data regarding such an operation. The 85 per cent operating load factor represents centres of population, supplying them; and, clearly, the cost must inveigh upon such an operating program; so that justification for such a program is an important matter in the economics of our pipe line; and I consider that is the primary question Mr. Nickle had in his mind. In that regard I might point out that the major pipe lines of the U.S. use one of two ways to sell their offpeak gas and to maintain a high degree of operating load factor. Those two methods of handling their offpeak gas would be storage and interruptible industrial sales. Where storage is available it is actually preferable to provide offpeak gas to allow you to withdraw from that storage field in the winter time and in that way maintain maximum pipe line efficiency, to maintain your operating load factor, allowing you to sell to your heavy market, which is your domestic, residential and commercial consumer. And now, in the absence of adequate storage facilities on such a pipe line the pipe line company has one alternative and that is the sale of interruptible gas to industrial consumers which will allow you to cut their supply off at a time when it is required for peaking purposes and domestic consumers.

And now, on that basis, we have worked out here a fifth year analysis of the cities proposed to be served by this pipe line.

Now, perhaps I should deal with apparent discrepancies between this analysis and the material which appeared in the original report submitted to the committee. In the original report we designed a pipe line based primarily on a second year load, because it would be impossible to secure financing if you allowed $6\frac{1}{2}$ to 7 per cent earnings to await a longer period

than that to be realized; so we strove to reach that through the design of our structure in the second year of pipe line operation. Now then, in establishing our ability to serve the market on to the fifth year we have studied closely the industrial markets available to the pipe line on the basis of the domestic and commercial growth experienced in these cities along our line. We have taken into account the number of oil burners which have been installed in each of these markets over recent years and the readiness of the various customers to convert to natural gas; and, in making this survey, we have had the experience of some 300 cities which we have served and which have gone through a similar experience; that is, have had experience with natural gas, particularly in relation to the 3 to 5 years following construction of the pipe line; and others such as commercial, converting from the use of artificial gas to natural gas. Following that you begin to arrive at the general experience, practice and detail with respect to the supply of gas to each of these cities. This study is an analysis of the supply of gas for such an operation. The other method of survey has been accepted, both by the Power Commission of North America and as the general practice of market analysis companies in the States. On the basis of that analysis this 65 per cent consumer load factor, worked out for the survey at Winnipeg, is as follows: we estimate that in the general market area of this pipe line we would have an annual degree day deficiency of approximately 10,000. I might explain that degree day deficiency in this way; we consider 65 degrees a normal day, the point at which you begin to heat the home, so that every degree that is experienced below 65 throughout the year is a unit of degree day deficiency; therefore, explaining that on a day by day basis for 365 days we have an annual occurrence of unit degree day deficiency. This experiment which has been carried out has been supported by the Bureau of Labour Statistics and the American Gas Association and others, and it establishes that 30 cubic feet is required for each unit of degree day deficiency. I know that sounds very complicated, but that is what we call the deviation factor in pipe line operation. That is an important factor which is present and has to be considered in a number of aspects. For instance, at 20 degrees below zero, let us say that is experienced at Regina, and you have 45 degrees below zero which may be experienced at Winnipeg—I am using that just as a convenient example, not as an actual case—we need to carry a peak load on this pipe line at all points in this regard, and we have to make allowance for some flexibility. Now then, this one station on this pipe line has an intake pressure of 570-590 pounds. The normal pressure is a 1,000 pounds a station. We would not need that entire 1,000 pounds pressure to maintain our forecasted 85 per cent operating load factor—particularly as soon as we get our loops built in our line to Winnipeg, so as to be able to maintain the pressure required. You also have the deviation factor of pipe line operation in that regard to use in these steam generating plants which are spread out along this pipe line, so as to be able to utilize the pressure on your pipe line as your load declines. In other words, while we will supply an interruptible service to these steam generating plants they will also to a certain extent continue to depend on oil; nevertheless, we will be able to furnish some gas to these steam generating plants, but at times their gas supply will be restricted. As the domestic and commercial load otherwise declines we increase the supply to the steam generating stations as an interruptible supply. They are restricted in their use of gas. These are essentially the standard figures and the amount they get depends on consumers demand. Theoretically, the entire interruptible supply will be going to those steam generating stations; any excess of gas will be used by them. But what we are looking at is this 100 per cent load factor. We have sufficient facilities along this pipe line to take care of the entire interruptible supply considering that this unit that we will be operating will be operating at about 30 per cent operating load factor.

Now then, to give you the load in the case of this operating pipe line to which I referred a moment ago; where you are using one of these two means to build up your gas reserves, they have been able to maintain a 95 per cent operating load factor, using storage to maintain their peak gas. Eastern pipe lines are maintaining a service into Montana and west of there operating at about 95 per cent operating load factor, and they are doing that through the medium of these interruptible sales and storage. Last year, during the coldest days of the winter they maintained, there over the year experience was that they maintained a 95 per cent operating load factor and did not have to cut off their interruptible load customers at all. And now, by that I mean they have sufficient storage capacity in this storage field to maintain their operating load factor on that pipe line. Another case is that of the trans-continental serving New York city which maintained about a 95 per cent load factor, and one of their main customers is a steam generating station in the city of New York, and they were able to serve them also. The Northern Natural system is one of those which is not operating at as high a load factor as the others. The load factor maintained by them to central points in the west such as Minneapolis and St. Paul, is around 78 to 79 per cent; but in their case they have no storage field available whatever, they are utilizing small interruptible contracts. Growth of population is also a factor which has to be considered. Your firm use comes from your domestic and commercial consumer, and as well from your firm industrial users. It is factors such as those which play a major part in the picture throughout your operating year, and it is that volume that is created in consumer demand which you have to depend on to maintain this load factor. It is with the expansion of that consumer load to which I referred that you build up in your fifth year what I have shown in this analysis, and in doing that you arrive at the consumer load indicated in the survey for the fifth year which serves about 79.83 million per day.

By Mr. Nickle:

Q. Is that in this report?—A. These tables are just one of those load factors.

Q. You have summarized them?—A. I have summarized them.

Q. The total load is 79 million?—A. 79 million. Now, you will notice an apparent discrepancy between the figures in the report submitted to you earlier in this proceedings and the figures in the report which has been presented to you this morning on the consumer load survey based on a five year experience. The reason for that apparent discrepancy is, as I stated, that we have designed for a second year. In other words, our first report shows what we hope to realize in the second year. The first report, dealing with second year operations, indicates what is necessary to maintain the volume of gas which will make the pipe line profitable. Our proposal to our clients is that they sell in this manner, that they establish contracts with the stations on a firm basis for approximately 3 years on a certain volume of gas and on an interruptible basis following that 3 year period. That will allow for the probable gradual growth of these utilities and having an interruptible gas market available at the time when it is required. You will notice in the case of Brandon we forecast 1,000 million cubic feet (M.C.F.) in that second year. In this consumer survey on the 5 year basis you will notice that we have shown a different figure, that we will need approximately 5 million cubic feet per day. At the present time there is not a sufficient interruptible load available at Brandon to support that additional load. What we have done is to design a pipe line which will give us the types of gas needed up and down the line. Now then, the fact is that we have not found the enthusiasm at Brandon for natural gas which is anything like what we have experienced with other cities along the line. You see, you are greatly limited in your ability to expand by the willingness of potential customers to convert, to spend money for the conversion

of oil or other types of units to use natural gas. Then to, an important factor, is interesting distributing companies in going to the expense of installing the equipment and system necessary to supply gas to a city like Brandon. I give you the case of Brandon as an example of the difficulties and the restrictions which are involved in making a market survey of this kind.

One further remark before I complete my explanation of these economics and the reason for the very cheap cost our client is experiencing in regard to this survey. The reason for that is that we have handled a number of other pipe lines that we have been on, several of which I have mentioned, particularly some of the major pipe lines in the United States; and we are more than willing to have a special arrangement here, our arrangement is to do this work for our clients at absolute cost, and we are doing that in the hope of getting the engineering contract for this large job. We are a completely integrated company with marketing services available, and we are an engineering and construction firm as well; we have some 3,500 people in our employ and we are primarily engineers; and we are most anxious to build this pipe line. And now, I think I mentioned to you on a former occasion, that the ownership of this company is 75 per cent Canadian; we have requested 25 per cent of the stock as a fee for our engineering services; that is, for doing this job at cost. We are not participating in the pipe line company.

Now, gentlemen, I think that with these remarks I have briefly set out the basis for the economics for that particular project. All of our projects have been financed in New York city by established financial houses. I think that we have tabled the machinery on that point before you.

By Mr. Carroll:

Q. You referred to the Brandon situation. Is there any basic reason why the people there are not very much interested, not as much as other people along the route?—A. No, sir. I think that when the time comes they will be just as enthusiastic about it as the other cities. As I explained, our people found that in Brandon they are well set up with oil heating furnaces, but, like other cities along the route of our pipe line, they have been growing rapidly. At the present time they may be interested in oil, and that undoubtedly has something to do with the lack of enthusiasm there; and, further, I imagine a good many of our potential customers have oil furnace installations which are being financed on a time basis and that is, of course, a matter which complicates the picture, making such a potential customer less inclined to take on the added obligation of converting from oil to a gas furnace.

By Mr. McIvor:

Q. Mr. Herring, when do you expect to start building your pipe line?—A. Well, sir, I would imagine that would depend on how soon they get the necessary authority. My own view is that they should apply as quickly as possible to the province of Alberta for gas. A great deal would depend on the degree of co-operation we receive there, because we would require that in order to be able to go before the Board of Transport Commissioners. We feel that one summer's construction period would enable us to build this pipe line. If we get the necessary approval we can go ahead this summer it should not take very long to have the pipe line in operation, that is providing we can go ahead with construction this summer, we can do it in one summer. However, if we have to wait until the fall before we get our necessary authority we would not be able to commence construction of the pipe line until the following spring.

By Mr. Nickle:

Q. Mr. Herring, in your survey, dealing with Winnipeg first, approximately 65 per cent of your annual load, according to your figures, would represent the interruptible industrial load. Could you give us any specific figures as to what

industries would actually use that volume of gas that would be available to them in the fifth year?—A. The survey was created, or carried on—rather it included the steam generating station of the local power company there, and again I qualify myself in that I did not make this survey personally, we contacted that agency—then there is the meat packing plant and two small industries which gives them the necessary volume represented by those figures.

Q. Mr. Herring, during this last period, since the last session, I, like yourself, have been doing some investigating to see the possibility, the economic possibility of this particular line stopping at Winnipeg; and I suggest that the large interruptible load, according to your figures, is the determining factor in whether or not such a line is feasible. I have done some checking up on the markets which might be available on an interruptible load basis, and at Winnipeg the information appears to be that the larger industrial markets are those which are basically on the same seasonal basis as the domestic consumer which would mean that these industrial markets would require their largest volume of gas during the winter periods when your domestic demand is at its peak?—A. Yes.

Q. And during the summer time when you would have an interruptible load available for industrial purposes industries would not require it. Would you give us anything on that?—A. Yes. For instance, in the steam generating station, and all of these industries, there will be a greater use in the winter time than in the summer time. The entire facilities we propose to use will necessarily have to maintain standby facilities. It is doubtful that we would ever supply the full requirements of the Winnipeg steam generating plant, nevertheless there is sufficient load available during the winter months for gas alone to meet—rather, I should have said, during the summer months—for interruptible gas to meet this volume of sales. And now, they seem to rely strongly on the power corporation there to give them the best information available, which they utilized, and that is the information on which we have gone.

Q. Could you file that letter with us?—A. Yes.

Q. I do not want to seem to be harping on this point but our own survey, a survey made on our behalf, of the Winnipeg market would indicate, of the industrial market, that your annual potential consumption would be considerably smaller than you have estimated here; that not only would this industrial figure be somewhat smaller but that the domestic demand would be relatively the same seasonally as this interruptible load, and that that would naturally result in very much smaller load factor than the 85 per cent that you say will be the minimum necessary to carry the line on an economic basis.—A. We would be glad to supply the basis of our prognostication to the committee.

Q. Could you give us specifically any other industry at Winnipeg which would be included in your 11 billion cubic feet?—A. Thus far we will not disagree on our supply. I do not think you will find a difference of more than 5 or 10 per cent.

Q. That is for your main users?—A. The primary companies to which I refer, the power corporation, the meat packing plants and two other industries. There will be a sufficient demand from those companies, as we see it, to carry the line. You will find that detailed in the letter which I have undertaken to supply to you. Unfortunately, I haven't got it with me at the moment but I will get it for you while we are here. We have very seldom had any questioning of our surveys in these cities and we have financed up to \$240 million in regard to major pipe line operations in which we are interested.

Q. Well, Mr. Herring, so that there will not be any misunderstanding I would like to make it clear that I am heartily in favour of gas export from Alberta, but I am also concerned, of course, that the company which goes out into the market to secure its funds has an economic and sound proposition to present.—A. Surely, we agree on that.

Q. I think that we should also check the economic feasibility of a route such as you propose, and I think that we should supplement with our own figures the information supplied to us from the U.S. in connection with the cost of a line from Alberta to Winnipeg. Over the last few years that route has been studied several times and on at least two occasions detailed submissions have been made to the proper authorities in Alberta, and they seem to indicate that a line from Alberta to Winnipeg, stopping at that point, would not be economic; that a pipe line could not pay off, nor could gas be delivered at a competitive price with other fuels. It was for that reason that we thought it desirable to have separate surveys made in order to determine the possibility of developing and maintaining a more adequate load. There was one company, with which you are no doubt familiar, that planned to build a route to Winnipeg to serve the mid west, and after a review of the situation they decided to go ahead with a project in an entirely different direction. Now, as a result of these surveys, we have had some submissions made to the Alberta Oil and Gas Conservation Board.

Mr. CANNON: Mr. Nickle, on whose behalf were these surveys made? You say "We did this" and "we did that" but the committee might like to know on whose behalf the surveys were made?

By Mr. Nickle:

Q. I have been trying to accumulate the information relative to industrial markets in the last week. As to the economic surveys and the industrial surveys of the line from Medicine Hat to Winnipeg, the one filed with the Alberta Conservation Board was made by the firm of Ford, Bacon, and Davis, for West Coast Transmission Company in 1950. The conclusion reached by that engineering firm, which I think you will admit is a firm whose reputation is on a par with that of your own firm, was that a line to Winnipeg, and stopping at that point, would not be economic because of the low load factor and the absence of any large industrial market that could be supplied on an interruptible basis.

Now, a very detailed engineering survey was made by the company which was first in line for ratification or incorporation, the first to seek a permit to export gas eastward from Alberta, Western Pipe Lines. I understand their survey, although they did not file detailed engineering reports with the Conservation Board of Alberta, indicated the same conclusion as that reached by Ford, Bacon, and Davis. In other words, a line through Saskatchewan to Winnipeg would not be economic and their plans, as you know, have been revised to provide for something like 25 per cent of their market in Saskatchewan or Manitoba, and roughly 75 per cent of their market in a much greater industrial load market—the mid-west United States.

In view of the conclusions reached by these two other firms we would like to know how, in two years, has the picture changed so drastically that a line to Winnipeg is now completely economic and can pay off?—A. Do you have the load requirements as forecast by those two companies? I would like to take Regina first?

Q. I did some comparing of the last report to the Alberta Conservation Board by Western Pipelines with your own preliminary briefs. First, the maximum daily demand for the first year's operation serving all communities which you have listed on your proposal—Regina, Moose Jaw, Swift Current, Brandon, Portage la Prairie, Winnipeg, Transcona, and Selkirk—is 44.85 million cubic feet, compared with your 74 million. Their estimate of the annual demand for the first year is 6.087 billion cubic feet, compared with

your figure of 22·95 billion cubic feet.—A. All right, sir. From that information it is quite obvious that if you receive letters from say five key industries supporting our information on the interruptible and domestic markets that would make the difference.

Q. That is right?—A. We would be glad to supply the information. For instance, at Regina the local power station will use 17 million cubic feet a day. That does provide for a very large sale to industrial markets during the initial years. The present price of oil is a factor. They have all started going to oil but its price is above the competitive price which we forecast and we have their statement that at competitive prices or better they are ready to go for natural gas. I would be glad to supply the information.

Q. Did this particular power plant supply you with figures for minimum and maximum demand?—A. Daily and by months.

Q. How much of a swing is there between the low point of domestic demand in the summer and in the winter?—A. In Regina, no more than 15 per cent.

Q. In that connection would you provide us with your figures for Regina?—A. Yes.

Q. By companies, for the interruptible load?—A. We will file that with the committee.

Q. And the same for Winnipeg. This figure of 11 billion cubic feet is a very large percentage of the 65 per cent total Winnipeg demand, and a very large per cent of the total demand which you expect to be served by that system in the fifth year of operation. For that reason and in view of the fact that two other companies have made economic surveys and have come to an entirely different conclusion, I feel that this committee should properly have access to complete details of the industrial markets proposed to be served by Boundary?—A. We readily acknowledge that the basic economic support for this pipe line is the industrial market and we would be glad to supply the information.

Q. Have you that information in Ottawa with you?—A. No, I have not. I will wire Houston for it.

Mr. CANNON: Were the surveys made by other companies which you mentioned made in relation to the fifth year of service?

By Mr. Nickle:

Q. I will give the fifth year of service which will perhaps be a fairer comparison with your totals. You calculate by adding annual sales to the fifth year for each of these cities that you will have a market in the fifth year of 26·385 billion cubic feet. The figure for the same cities for the fifth year calculated a few months ago by the engineers for Western Pipe Lines, prepared by Stone and Webster Surveys Corporation, a top ranking firm of engineers, is 15·46 billion cubic feet, which is roughly 55 per cent of the market which you calculate.—A. The actual difference you are presenting lies in this load factor you are speaking of. If there is sufficient market in these cities to maintain the load factor their figure would come on up to approximate ours. In other words, the figures for the industrial market in the initial years support the pipe line. It is not economical to build a pipe line solely for domestic consumers. The thing I should do is to establish for you the evidence we have on the industrial markets.

Q. I will go a little further and then come back to the industrial markets. Again, quoting the figures of Stone and Webster on behalf of Western Pipelines, and given to the Alberta government, the load factor calculated for the first year is 37·2 per cent.—A. Does that include interruptible sales?

Q. Yes. The load factor calculated for the fifth year is 38·3 per cent. According to your statement you require a load factor of 85 per cent to

carry the pipe line?—A. I would like to clarify that. To make sales at 25 cents per m.c.f. in Regina, wholesale, and at 30 cents per m.c.f. at Winnipeg, we will require an 85 per cent operating load factor. That will give us a price below oil for those two consumers. We need to approximate that price and we can show you that evidence.

Q. Well, since during the easter recess we did not have this consumer load survey that you have just given us, I had to use the calculations which you did give us at the first meeting. Using your cost figures throughout and using Western Pipe Line figures on the markets for the several communities you would serve, I have arrived at a few figures which may be of interest to you. On the basis of Western Pipe Lines market survey you would have an average cost of gas, to earn you $6\frac{1}{2}$ per cent, of 81.58 cents per m.c.f. for the first year's operations?—A. Are you sure that is correct.

Q. On the fifth year, again using Western's figures you would have an average cost of gas, in order to earn $6\frac{1}{2}$ per cent, of 37.3 cents per thousand cubic feet. Your own calculations are based on a 27.9 cent average price. Now, what would a price in the fifth year, almost triple the price for the first year do to the economics of your line? To what extent would the higher cost of gas eliminate the industrial, domestic and commercial markets?—A. The domestic and commercial markets could stand a higher price, but without that industrial market that pipe line is not economically feasible. The thing we have to do is to beat the price of competing oil in those markets.

Each point you have brought up comes back to the same thing—that the industrial market must be there to support the pipe line. If we supply that information it seems to me that we have answered each question that you have in mind.

Q. It boils down to this. If you can establish an industrial market on an interruptible basis, which would not reflect the same trend in seasonal demand as does the domestic market, a line to Winnipeg would be feasible?—A. We must utilize this industrial gas available in the summer time. We will supply information on the basis of the demand volume that exists for those summer months on an interruptible basis.

Q. Would you list each market in each community, giving us an indication of its annual demand for gas—its minimum and maximum annual requirement related to months.—A. In other words, going beyond the industrial information I should give you the domestic and commercial information as well.

Mr. WHITMAN: Are you prepared to do that?

The WITNESS: Yes, we are prepared to do that. It will take a matter of two or three days for me to get the information.

The CHAIRMAN: Are there any further questions from you, Mr. Nickle?

Mr. NICKLE: That pretty well covers my questions.

The CHAIRMAN: Is it your wish to have this report that Mr. Herring has given us printed as an appendix to our proceedings?

Agreed.

By Mr. Green:

Q. Mr. Herring, can you give the committee some details of the market for natural gas in the mid-west States?—A. Of the United States?

Q. Yes.—A. No, sir but that information is readily available through a book known as Brown's Directory. It gives the entire sales of Northern Natural which covers those states. I do not have that information with me. I might add one thing—the over-all sales of Northern Natural are somewhat over 850 million cubic feet in their pipe line system.

Q. Where is that?—A. From the Panhandle in Texas to Minneapolis and St. Paul—covering the cities and routes such as Omaha and others.

Q. Well, if you are able to get sufficient gas in from Alberta you would be running a line or lines down to the boundary?—A. No, sir. Our recommendation to our clients has been this, as previously stated: That the initial objective should be to serve these two provinces since we have established this market. If additional gas is available at the time we are ready to market it we would recommend the most economical way of handling any declared surplus from Alberta—on the basis that the only economic area is the central United States.

Q. What do you mean by the central area?—A. The area served by Northern Natural which is the company that Western has proposed to sell to.

Q. Do they serve Minneapolis and St. Paul?—A. Yes.

Q. Chicago?—A. They have no service in Chicago.

Q. What about Milwaukee?—A. The Milwaukee system is served by Wisconsin. I think it is a different system.

Q. How would that market for gas compare in size with the markets there would be in Saskatchewan and Manitoba?—A. Considerably greater. I might point out just one thing. A pipe line company is always seeking these off peak sales. One of the most advantageous sales by Northern Natural has been that involved in the dehydration of alfalfa for the making of pellets for cattle in the winter months. It would be a very advantageous thing for Saskatchewan and Manitoba.

Q. What would be the comparison between the market in the Canadian provinces, Saskatchewan and Manitoba and that in the central States?—A. I do not think you can compare the two. You can take pipe lines and compare them but without the industrial markets and a complete survey of them there is no comparison between the two. In other words, the Northern Central system would not be economically operated without the interruptible sales. The big power plant at St. Paul is one of the main off peak customers. The same is true for this pipe line. You have got to maintain the off peak sales or it is not economical.

Q. You would not go any further except to say that the market in the central States is much greater than that in Saskatchewan and Manitoba.—A. Yes, that is correct.

Q. Is it several times larger?—A. Yes.

Q. If the gas should go in that way to the central States, by your pipe line or through pipe lines with which your company makes an agreement in the United States, where will Ontario and Quebec get their gas?—A. Well, sir, as previously stated, the advice we were presenting or that we would present at that time would be based on pure economics. As an engineering company we have put testimony forward in Alberta in which we have stated that the logical way, in our opinion, in which to serve Ontario and Quebec is by an exchange of gas with the United States. A pipe line with excess capacity already exists. It goes into Detroit with two twelve inch lines across the river. The facilities are available for such service. We still contend at the present time that is the economic way of getting gas to eastern Canada. There again we come back to the problem Mr. Nickle has been bringing up—without the economics you cannot build a pipe line. As an engineering firm we would quickly lose our reputation if we did not remember that.

Q. You think the plans of Trans-Canada Pipelines, which of course were backed by engineering opinions, are not economical?—A. On the basis of our market survey the average price paid by industry today in Ontario and Quebec is 42 to 43 cents. In our opinion you must beat that price to establish a market for gas during the years while you are waiting for the build-up of the domestic and commercial customers.

Q. Well, you realize that Trans-Canada Pipelines is the company which was planning to build a line from Alberta right through Canada to Toronto and

Montreal?—A. That is correct. Their own testimony was that they would require an 85 per cent operating load factor at 15 cents per m.c.f. average price for the sale of their gas, to bring the \$350 million odd back here to eastern Canada—Ontario and Quebec. On that basis we think that the price is approximately 6 cents too high, and we think some method of defraying the cost must be discovered in order to enable that company to sell gas in these two provinces. The only thing we can think of is a subsidy or some other method of defraying costs such as relief from income tax while they build up the company. Again, we are giving you the economics as we have judged them from an engineering standpoint. We have studied the Trans-Canada estimate but we are not in agreement with it. I could go into further detail on the basis differences between the two companies but I do not think it necessarily arises.

Mr. Mutch: It might be very interesting—

By Mr. Green:

Q. Well, you say then that the Alberta gas coming east should go to what you call the central States and that Ontario and Quebec should rely on gas coming directly from the United States?—A. If there is sufficient gas to do so. If gas can be moved from Alberta clear through the prairie provinces to serve the northern central territory with great volume it would establish a basis for reciprocal exchange. Likewise, if there is sufficient gas for the Pacific northwest there would be a basis for exchange there. That would be our recommendation at this time.

Q. Your plan for Ontario and Quebec is that they should get their gas from Texas?—A. From the Panhandle Eastern system, yes.

Q. And that would mean they would have to make some agreement with the American companies before they could get American gas?—A. I think it would be the other way around. For instance, the first movement of gas under such an arrangement would be from Canada to the United States. If your Board of Transport Commissioners agreed to such an arrangement they could provide their own terms and conditions under which it could be carried out; and then any effort on the part of the United States to carry out the exchange would be at their initiative. In other words, the agreements would be by American firms with Canada.

Q. Is your company known as the Fish Engineering Corporation?—A. That is correct.

Q. Is Ray Fish the chairman of that corporation?—A. He is president of the company.

Q. He is also chairman of a company known as Northwest Pipelines Corporation?—A. Pacific Northwest Pipelines Corporation.

Q. Pacific Northwest Pipelines Corporation?—A. That is correct.

Q. You talk about this exchange basis but I suppose you know that within a day or two after the Alberta Conservation Board recommended that gas be exported from the Peace River district to the west coast, your president, Mr. Fish, stepped right in and said: If this was going to be done he was going to put Texas gas into Oregon and Seattle to prevent gas from the Peace River district getting into that market?—A. I do not believe he said that.

Q. What did he say?—A. Well, if I may ask the indulgence of the committee—

Mr. Mutch: This certainly requires it, and most of the discussion for the last half hour has been completely unrelated to what is before the committee.

Mr. Green: Mr. Mutch, perhaps you were not here.

Mr. Mutch: I have been here since the beginning.

Mr. Green: I speak of the first sittings of the committee. As far as I am concerned the only thing I am interested in is that Ontario and Quebec have an opportunity to get Canadian gas. That is all that worries me and if you are not interested in that it is a different matter.

Mr. MUTCH: Naturally I am interested in anything that interest Canadians in general, but I am one of those peculiar people who try to organize their minds—

Mr. GREEN: Hear, hear.

Mr. MUTCH:—in order to deal with the matter before me. The application before the committee at the present time has relationship to nothing east of Winnipeg. Although I have enjoyed it and I do not object, for the last half hour we have been arguing the whole question of exporting gas—a subject which has been argued ad nauseam and which will continue to be so argued. The fact is that the discussion has been informative but bears no relation to the responsibility put on this committee—that of dealing with a specific bill. Of course I am interested in what happens to the country.

Mr. GREEN: It is very material because this company is asking permission to pipe gas outside of Canada. It was admitted the other day that they were planning to pipe it into the central States. Mr. Herring has admitted the same thing today and says that he believes that is the economic way to dispose of surplus Alberta gas. If this is done—and I think this is also admitted—Ontario and Quebec will get no Alberta gas and they will have to depend on some kind of an agreement with the States for just what is left over of American gas; and that is the important point, that is the issue at stake here. My question, I want to make perfectly clear, is entirely relevant, Mr. Chairman.

Mr. MUTCH: I disagree with you on that.

Mr. GREEN: I did not expect you to agree with me on anything.

Mr. MUTCH: I have to be consistent.

The CHAIRMAN: Would you answer the question, Mr. Herring?

The WITNESS: In answer to your question may I say that our company has been very active in the promotion of pipe lines in the United States because it is our feeling that without such promotional activities these pipe lines would not be built. With our experience of approximately six years in building the trans-continental system to New York from Texas—with that background we entered the Canadian picture. At that time it was our hope to build a pipe line from Texas sources to the Pacific north-west, to bring the Alberta gas into the market from Pincher Creek, with the idea that a joint service of the market would be doubly dependable; if it would provide Alberta with the means of initiating service on a small basis and it more nearly meets the needs of Alberta for their own requirements. We proceeded with that application in Alberta. During the interim period it became apparent there was sufficient gas for the entire market. We applied for such a service. At the time approval was given for 300 billion cubic feet, which today is sufficient for 30 million cubic feet per day. At the time that was granted the other applications were turned down. We offered last year to supply the Pacific north west country with Texas gas at 38 cents per m.c.f. At that the time the Gulf Company entered the Pincher Creek field and offered to market a 30 cent gas until Alberta approved the Pincher Creek field. The idea was that they would agree to sell Pincher Creek gas at such a price, that the difference in price would be sufficiently attractive to the market. They waited. Alberta turned down the export of gas to United States areas on the basis that to supply the American continent down there would not be possible because the 300 billion feet of reserves would be insufficient to supply the market.

Mr. CANNON: Pardon me, Mr. Chairman, but I can hardly hear the evidence of the witness. I wish he would speak more slowly so we would be able to hear him.

The WITNESS:—because the 300 billion cubic feet of reserves would be insufficient to supply the market, and as a result of that the markets have

requested us to come back with the Texas proposal. We are doing that at the present time. A meeting took place yesterday, and is continuing today on such a proposal. Even if we are successful in supplying gas to the Pacific north-west market we are still extremely anxious to get gas from Canada, at the same time as the west coast discover their reserves and bring them into Vancouver for delivery in that market. I have never seen the day in a populated section where 200 million cubic feet of gas was not a marketable item. We have been informed that the west coast, if they had the reserves, have the market; and any such agreement at that time was entirely feasible. We would prefer to have the gas come from Pincher Creek because there are two trillion of proven reserves in that field. It requires a large volume to be economical because of the extreme cost. I think that is a logical service. They have turned that down for the time being. That is the present status of that entire picture up there. We are not threatening in any way in this remark that has just been made, the Alberta government or the Canadian government. We are trying to get gas to the Pacific north-west market because we own the Spokane distributing system and we are losing money there every day, and we would like to get enough natural gas in there to serve the market.

By Mr. Green:

Q. Mr. Herring, is your Mr. Fish or his company a leading spirit in the complaints that have been made, that are being pressed by the distributing companies in either Spokane, Portland, Seattle or the other points?—A. No, sir. We are not taking any questionable attitude. We have been one of the most active participants in the Alberta picture and we will continue to be one of the most aggressive participants in here. Any time a sufficient volume of gas is available to make it economically feasible to develop sales through pipe lines and otherwise we would be actively in the picture, we are very anxious to assist in this development.

Q. I asked you that question because of the fact that on my way through Calgary on Saturday I picked up a Calgary paper, the *Calgary Albertan*, for the 19 of April, 1952, and it bears the heading that, "Irked at Alberta—seek Texas gas". This is the report indicating that Pacific north-west pipe line is planning a "130 million Texas-Puget Sound natural gas pipe line"; and that Mr. Gellert, president of the Seattle Gas Company, said that executives of the firms supplying Spokane, Yakima, Tacoma, Bellingham, Wenatchee and Walla Walla will leave here (Seattle) by plane with him Saturday for Texas. He said (and I quote): "He said the group would confer Sunday and Monday at Dallas with Ray C. Fish of Houston, whose Pacific Northwest Pipeline Corporation is planning a 130 million Texas-Puget Sound natural gas pipe line".

Mr. Herring, am I putting the picture unfairly when I say that your company has been behind the Pacific Prairie Transmission Lines Limited?—A. Yes, sir; our company associated itself with Prairie at the time it became interested in the general supply to the north-west, in order to secure additional necessary facilities.

Q. And the plan of that company was to draw off the gas from Pincher Creek in southern Alberta and take it down into the States at the nearest available point to serve Spokane, Seattle, Tacoma and Portland, with a stub line up to Vancouver; that was your plan for Prairie Pipeline transmission, was it not?—A. That is correct.

Q. And you ran along until you made your application to the Alberta Natural Gas Conservation Board, did you not?—A. That is correct.

Q. Along with the other companies with which you were in competition, and about three weeks ago the Alberta Gas Conservation Board recommended that gas for the west coast should go from the northern part of Alberta. That was the picture up to that moment, that is correct so far?—A. Not entirely.

Q. Well, would you correct me?—A. Just at one point which I would like to put to you and that is that we offered gas last year to Pacific Northwest but they did not deem it feasible to carry the supply from the Peace River field; but we have been actively engaged in developing the supply of gas from Alberta to be part of that picture.

Q. I see.—A. And we have continued our active interest, but the picture changed with the recommendation of the Alberta Conservation Board. Following that the Alberta Board came out with the announcement regarding the west coast line and taking gas from the Peace River field. •

Q. Yes.—A. You referred to one market in which we are directly interested as a distributing company. You referred to Mr. Gellert, the president of the Seattle Gas Company, that is one of the distributing companies. You may recall that Mr. Gellert made the statement last year that it was very difficult to find an adequate supply of gas to serve the market, that the situation was becoming very difficult insofar as operating in and around Seattle was concerned, and that Alberta had turned him down. It was then that he issued a prepared statement to the press announcing his opinion that there would not be sufficient gas available from the Peace River to supply the north-west market area, and that is why he re-opened the Texas proposal; and, in that connection, I do not think the implication of juggling is fair either to him or the company.

Q. Well, the same day that the Alberta Conservation Board made their announcement your Mr. Fish rushed into print with a statement saying that he would get Texas gas to supply Tacoma and Portland.—A. The following day, the day following the day he had that conversation with Mr. Gellert.

Q. But Mr. Fish himself rushed into print with a statement criticizing Alberta, saying that he would not be able to get sufficient gas to serve the market from that quarter.—A. I do not think that is correct. What Mr. Fish said was that they would go ahead with the Texas proposals, and that while it was the intention to do that he was still extremely anxious to get Alberta gas, and is still anxious to get gas from Alberta.

Q. But in the interim he said that he would go ahead and get the Texas gas into Oregon and Washington.—A. Well, still awaiting the decision of the Alberta government, probably sometime next year; that is probably correct.

Q. Now, in this bill which you are sponsoring, which you are supporting, you are laying another plan to get Alberta gas down into the central States?—A. That is correct.

Q. And so far as Ontario and Quebec are concerned—

Mr. WHITMAN: Where does the bill state that?

The CHAIRMAN: I don't see that.

Mr. GREEN: Now, the witness has made his statement. Is that your plan, or is it not?

The WITNESS: I think, Mr. Green, I have made it very clear that I would recommend to the company at such time as there was sufficient gas to make it economical to use that gas in that way we would do so. At the present time our information is that there is not sufficient gas in Alberta and that has been turned down by these officials in Alberta with the result that it is not possible to go through with that program. At the same time we think the program outlined in this bill is a sound program. I might point this out by explaining that this is chiefly the type of information that would be presented before the Board of Transport Commissioners and accordingly we did not have prepared in final form information of that kind in the same detail,

not knowing that this committee would be interested in it. I can secure it and will be glad to furnish it to the committee. However, I may say that we are not at this time contemplating building anything beyond Winnipeg.

By Mr. Green:

Q. Then your recommendation would be that if there is more gas than you require for Canadian prairie use, that such gas go down to the central states?—A. If there were sufficient gas right at this moment for a service through Winnipeg to a further point, and if that volume ranged around 100-150 million per day of deliverable gas available in that volume at that point, we would study the situation and would recommend that the gas be carried on through to other markets.

Q. Through a distributing company?—A. Through the transmission company.

Q. Going to the central states?—A. Yes. If there were available beyond Winnipeg at this particular moment 450 million cubic feet above this 75 million cubic feet, there would be sufficient more for it to be economical to carry it on to other markets and I would recommend that the company transport that further, if it could be established to be economic at that point. It would require, as I say, 450 million cubic feet. I think that would probably be economically safe.

Q. Then Ontario and Quebec would have to rely on a deal with United States gas companies?—A. In the event of a limited service, on the basis of present day economics, that would be what I would recommend.

THE CHAIRMAN: Are there any further questions for Mr. Herring?

MR. NICKLE: I would like to hear Mr. Herring discuss this a little further, the issue involved.

HON. MEMBERS: Hear, hear.

THE CHAIRMAN: There is no doubt about that.

MR. NICKLE: I want to say this, however, that this restricted export from Alberta does present a rather serious change which I think has a bearing on the picture so far as Alberta is concerned. The big question is whether or not we have the volume of gas sufficient to supply, to justify export, and to satisfy the needs of the adjacent population. Of course, we also realize this, that an important aspect of the matter is, is Vancouver going to get gas from Alberta; and, also, is there a market. However, we are apparently engaged in a very serious race with Texas in that market, getting the Pacific north-west of the U.S. As, of course, most members of this committee are well aware, the export of gas is a very hot-footed issue, and that while it has many proponents, it also has many opponents. We have a political leader in Alberta who says, no gas export, and that opposition is very bitter in Alberta; but, with it, I heartily disagree. But, this as an economical pipe line down to the Pacific coast depends upon a large U.S. market. That evidence that I have so far would indicate that any pipe line eastward across the prairies is dependant also upon a large market, either in eastern Canada or in the U.S. mid-west. Now, Mr. Herring, your application covers only one thing, and that is a line to Winnipeg?—A. Yes.

Q. And if you can clearly establish the economy of that line, that it is sound economically—which means that you must find an industrial load, an interruptible load which will carry over half of the total gas you expect to put through that line, then you will have made a case.—A. We will be glad to supply that information, to see that that is established.

Q. Another point; of course, any pipe line must be able to establish a sound case for spending thousands of dollars supplied by Canadian investors

and be able to operate at a reasonable cost to the areas it seeks to reach. Could you have this detail broken down for us in relation to the various markets? When could we expect that?—A. This is Tuesday; say, Thursday. I can mail it to you tomorrow afternoon—Friday would be a safe bet.

By Mr. Hodgson:

Q. Mr. Herring, will this line that you are proposing conflict with trans-Canada? Is it necessary to have two pipe lines crossing the prairie provinces?—

A. My opinion on that would be this. If this pipe line is built to serve these prairie stations and additional gas from Alberta becomes available later on, this pipe line would bring that gas further on without the necessity of extending the operation. It can be established and in operation; and I think it would make it a more attractive proposition both to the market and to the producer of gas—and even to trans-Canada—but I do not think that in as far as the trans-Canada project—from its point of view, I am of the opinion as an engineer that as gas is available in sufficient quantities for an adequate market to be served economically that it would be brought to the market.—Q. You mean that one pipe line is all that is necessary?—A. Yes, if it can be continued en route, and so forth.

Q. You mean that one pipe line is all that is necessary?—A. Yes, if it can be continued en route, and so forth.

Q. And if we built this one would it still be necessary to have the other?—A. It would not affect that development; for instance, you take down in the eastern States, there are a number of pipe lines serving the same areas.

Q. But, for a period of ten years?—A. Over a period of ten years, at the end of ten years, if any gas is brought into the Ontario and Quebec market—manufacturing gas, gas for electrical power production, and so on—it would be more difficult to establish a market 10 years from today than it would be to do it right now. I think that most companies will agree with us on that.

Mr. MURPHY: Mr. Chairman, in view of the information required for consideration in connection with this bill I would move that the committee rise and meet again on Friday. We need this information and it will be available for us then.

The CHAIRMAN: May the preamble carry? Subject to that further information being given? Mr. Herring was going to send it to us for Friday.

Mr. NICKLE: Well, Mr. Chairman, the whole decision on the economics of this project hinges upon the plan, upon this information about industrial markets, and I would not be prepared as one member of the committee to pass any other portion of the bill until we have the picture in detail and have a chance to examine Mr. Herring on the industrial market upon which a line to Winnipeg would depend.

The CHAIRMAN: The motion before you is that the committee adjourn until Friday next, at 11 o'clock.

Mr. MUTCH: Mr. Chairman, I think it would be better if you were to adjourn the committee to the call of the chair. There is some urgency and a need for getting on with it and that would make it more convenient. I suggest that the committee adjourn to the call of the chair.

Carried.

The committee adjourned to meet again at the call of the chair.

APPENDIX A.

BOUNDARY TRANSMISSION LTD.

Consumer Load Survey

for

Proposed Transmission Facilities

from

Medicine Hat to Winnipeg

Prepared by

THE FISH ENGINEERING CORPORATION

BOUNDARY TRANSMISSION, LTD.

CONSUMER LOAD SURVEY

Winnipeg

Population	300,000
Potential meter saturation.....	67,000

Present data

	No. of customers	Annual sales MCF
Domestic	15,143	225,000
Commercial	895	82,000
Industrial	586	83,000

5th year of service

	No. of customers	Annual sales MCF	Peak day sales MCF
Domestic	25,000	3,990,000	42,200
Commercial	1,600	512,000	5,700
Industrial firm	850	570,000	1,900
Industrial interr.	3	10,950,000
Total			49,800

Domestic

10,000 units of DDD—Annual Basis

Dom. 300 c. ft. x 10,000 = 300,000 cu. ft.	
18,000 customers x 300,000 cu. ft. x 60% =	3,240,000 MCF
25,000 customers x 30,000 cu. ft. =	750,000 MCF
Total	3,990,000 MFC

105 DDD—Peak day basis

Dom. 30 x 105 DDD =	3,150 cu. ft.
18,000 x 3,150 x 70 =	39,700 MCF
25,000 x 100 cu. ft. =	2,500 MCF
Total	42,200 MCF

Commercial

40 cu. ft. x 10,000 =	400,000 cu. ft.
1,600 x 400,000 x 80 =	512,000 MCF annual
1,600 x 4,200 x 85 =	5,700 MCF peak day

CONSUMER LOAD SURVEY

Portage La Prairie

Population	7,200
Potential meter saturation.....	1,600

Present data

No gas company

5th year of service

	No. of customers	Annual sales MCF	Peak day sales MCF
Domestic	800	132,000	1,403
Commercial	145	46,400	517
Industrial
Total		178,400	1,920

Domestic

$$\begin{aligned} \text{Annual—} & 600 \times 180,000 = 108,000 \text{ MCF} \\ & 800 \times 30,000 = 24,000 \text{ MCF} \end{aligned}$$

$$\begin{aligned} \text{Total} & \quad 132,000 \text{ MCF} \\ \text{Peak day } & 600 \times 3,150 \times 70\% = 1,323 \text{ MCF} \\ & 800 \times 100 = 80 \text{ MCF} \\ \text{Total} & \quad 1,403 \text{ MCF} \end{aligned}$$

Commercial

$$\begin{aligned} \text{Annual} & \quad 145 \times 400,000 \times 80 = 46,400 \text{ MCF} \\ \text{Peak day} & \quad 145 \times 4,200 \times 85 = 517 \text{ MCF} \end{aligned}$$

CONSUMER LOAD SURVEY

Brandon

Population	17,400
Potential meter saturation	3,870

Present data

No gas company

5th year of service

	No. of customers	Annual sales MCF	Peak day sales MCF
Domestic	1,740	302,400	3,240
Commercial	480	153,600	1,700
Industrial—Firm	2	10,800	36
—Interr.	1	1,095,000
Total			4,976

Domestic

$$\begin{aligned} 10,000 \times 30 \text{ cu. ft.} \times 60\% & = 180,000 \text{ cu. ft.} \\ \text{Annual—} & 1,390 \times 180,000 = 250,200 \text{ MCF} \\ & 1,740 \times 30,000 = 52,200 \text{ MCF} \end{aligned}$$

$$\begin{aligned} \text{Total} & \quad 302,400 \text{ MCF} \\ \text{Peak day—} & 30 \times 105 \times 1,390 \times 70\% = 3,066 \text{ MCF} \\ & 1,740 \times 100 \text{ cu. ft.} = 174 \text{ MCF} \\ \text{Total} & \quad 3,240 \text{ MCF} \end{aligned}$$

Commercial

$$\begin{aligned} \text{Annual} & \quad 480 \times 400,000 \times 80 = 153,600 \text{ MCF} \\ \text{Peak day} & \quad 480 \times 4,200 \times 85 = 1,700 \text{ MCF} \end{aligned}$$

CONSUMER LOAD SURVEY

Regina

Population 70,000
 Potential meter saturation 15,500

Present data
 No gas company

5th year of service

	No. of customers	Annual sales MCF	Peak day sales MCF
Domestic	6,800	1,176,000	12,580
Commercial	810	259,200	2,890
Industrial—Firm	16	450,000	1,500
—Interr.....	1	4,380,000
Total			16,970

Domestic

Annual—5,400 x 180,000 = 972,000
 6,800 x 30,000 = 204,000

Total..... 1,176,000

Peak day—5,400 x 3,150 x 70 = 11,900 MCF
 6,800 x 100 = 680 MCF

Total 12,580 MCF

Commercial

Annual —810 x 400,000 x 80 = 259,200 MCF
 Peak day—810 x 4,200 x 85 = 2,890 MCF

CONSUMER LOAD SURVEY

Moose Jaw

Population 21,000
 Potential meter saturation..... 4,670

Present data
 No gas company

5th year of service

	No. of customers	Annual sales MCF	Peak day sales MCF
Domestic	2,100	360,000	3,848
Commercial	360	115,200	1,285
Industrial—Firm	4	60,000	200
—Interr.	1	1,277,000
Total			5,313

Domestic

Annual—180,000 x 1,650 — 297,000 MCF
 30,000 x 2,100 = 63,000 MCF

Total..... 360,000 MCF

Peak day—1,650 x 3,150 x 70 = 3,638 MCF
 2,100 x 100 = 210 MCF

Total 3,848 MCF

Commercial

360 x 400,000 x 80 = 115,200 MCF
 360 x 4,200 x 85 = 1,285 MCF

CONSUMER LOAD SURVEY

Swift Current

Population	6,000
Potential meter saturation	1,350

Present data

No gas company

5th year of service

	No. of customers	Annual sales MCF	Peak day sales MCF
Domestic	675	110,250	1,169
Commercial	110	35,200	462
Industrial—Firm	3	30,000	100
Interr.	1	365,000
Total			<u>1,731</u>

Domestic

$$\begin{aligned} \text{Annual—} 180,000 \times 500 &= 90,000 \text{ MCF} \\ 30,000 \times 675 &= 90,250 \text{ MCF} \end{aligned}$$

$$\text{Total } 110,250 \text{ MCF}$$

$$\begin{aligned} \text{Peak day—} 500 \times 3,150 \times 70 &= 1,102 \text{ MCF} \\ 675 \times 100 &= 67 \text{ MCF} \end{aligned}$$

$$\text{Total } 1,169 \text{ MCF}$$

Commercial

$$\begin{aligned} 110 \times 400,000 \times 80 &= 35,200 \text{ MCF} \\ 110 \times 4,200 \times 85 &= 462 \text{ MCF} \end{aligned}$$

